

NASA/CR-77-

206161

N1108-219

7N-61-CR
43 CIT**JOVE FINAL REPORT****Dr. Danny M. Vaughn****Weber State University****May 2, 1997****I. Research**

090 728

Brief description of research results to date on your project:

Several papers have been given to national level meetings and a paper has been published in an international journal. Several additional papers have been co-authored by students. The initial research project on the Atchafalaya Delta seems to have died in part due to a transfer of the NASA colleague to another location and subsequent reassignment to another job title. I have continued to include credit to NASA for many of my papers presented and published.

II Where do you see your JOVE research going after the initial JOVE funding expires?

I do not see the original work going beyond the stage that it is since my NASA mentor has moved to another base (Marshall SFC) and is assuming a different role. We seem to have drifted apart, although I would still like to work with him. It seems as if with the heavy teaching loads imposed on faculty at Weber State University, and the responsibilities that I have in maintaining the laboratory for remote sensing and GIS, that our productivity is waning.

III. Communication with NASA Colleague

I do regret not being able to continue the work with Dr. Rickman as I dearly enjoy the relationship. I think we have both assumed different responsibilities that have taken us away from our original plans.

Articles Published:

Vaughn, D.M.; 1996; A Major Debris Flow Along the Wasatch Front in Northern Ogden, Utah, USA; Accepted for publication in Physical Geography.

Vaughn, D.M., Rickman, D. & Huh, O.; 1996; *Spatial and Volumetric Changes in the Atchafalaya Delta, Louisiana*; GeoCarto International; Spring, 1996.

McNulty, P.G. and Vaughn, D.M.; 1996; *Using a GIS to Assess a Disparity in Time and Distance Traveled Among Handicapped Students on a College Campus*; Bulletin of the Association of North Dakota Geographers; Spring, 1996. (Accepted)

Moss, S.W. and Vaughn, D.M.; 1996; *Using a GIS to Assess Winter Habitat Sites of Pronghorn Antelope on Antelope Island, Utah*; Bulletin of the Association of North Dakota Geographers; Spring, 1996. (Accepted)

Vaughn, D.M.; 1993; An Analysis of Prehistoric Greenstone Artifacts in Northeast Alabama; Geoarchaeology: An International Journal; Vol. 8, No. 6., 15 p's.

Other Publications Published:

Book review (*Aerial mapping Methods and Applications* by E. Falkner) submitted for publication to **Photogrammetric Engineering and Remote Sensing**, Spring, 1996.

Oral and Poster Papers Presented:

Merrell, C. & Vaughn, D.M.; 1996; *Using a Geographic Information System to Assess Foraging Habitats for the Red-cockaded Woodpecker in the Big Cypress National Preserve, Florida*; Great Plains/Rocky Mountain Division of the Association of American Geographers; Annual meeting; Greeley, Colorado; September, 1996 (Abstr).

Ray, C. & Vaughn, D.M.; 1996; *Using a Geographic Information System to Analyze Optimal Areas for Septic Tank Locations; Tooele County, Utah*; Great Plains/Rocky Mountain Division of the Association of American Geographers; Annual meeting; Greeley, Colorado; September, 1996 (Abstr).

McNulty, P.G. and Vaughn, D.M.; 1996; *Using a GIS to Assess a Disparity in Time and Distance Traveled Among Handicapped Students on a College Campus*; Great Plains/Rocky Mountain Division. Association of American Geographers Annual Meeting; Rapid City, South Dakota; October, 1995. Abstr. published.

Moss, S.W. and Vaughn, D.M.; 1996; *Using a GIS to Assess Winter Habitat Sites of Pronghorn Antelope on Antelope Island, Utah*; Great Plains/Rocky Mountain Division. Association of American Geographers Annual Meeting; Rapid City, South Dakota; October, 1995. Abstr. published.

Nyborg, C., Nyborg, M., and Vaughn, D.M.; 1995; *Proposed Wilderness Areas of the Dixie National Forest Using A GIS*; **Fourth Annual NASA/JOVE Retreat**; Ames Research Center; Monterey, Ca; July, 1995. Abstr. published.

Wolfe, J.D. and Vaughn, D.M.; 1995; *Radial Relief Displacement in Vertical Aerial Photographs*; **Fourth Annual NASA/JOVE Retreat**; Ames Research Center,; Monterey, Ca; July, 1995. Abstr. published.

Vaughn, D.M.; 1995; *Geospatial Analysis as a Mechanism of Geographic Inquiry*; **Association of American Geographers; National Convention**; Chicago, Illinois; March, 1995.

Vaughn, D.M.; 1994; *An Assessment of Surfacing Algorithms*; **Third Annual NASA/JOVE Retreat**, Kennedy Space Center, Florida; July 1994.

Jennings, C. and Vaughn, D.M.; 1994; *Modeling a Mountain Trails Park in Ogden, Utah Using a GIS*; **Third Annual NASA/JOVE Retreat**, Kennedy Space Center, Florida; July 1994.

Winkelaar, M.P. and Vaughn, D.M.; 1994; *Modeling and Forecasting Avalanche Potential in Davis and Morgan Counties, Utah*; **Third Annual NASA/JOVE Retreat**, Kennedy Space Center, Florida; July 1994.

Vaughn, D.M.; 1994; *Assessment of Surface-Generating Algorithms to determine Area and Volume*; Association of American Geographers; National Convention; San Francisco, California; April, 1994.

Vaughn, D.M.; 1993; *Geospatial Analysis at Weber State University*; GIS Awareness Seminar; Cedar City, Utah, November 29-December 3, 1993.

Vaughn, D.M.; 1993; Invited discussant on a panel addressing the issue, *Where Do We Go From Here? Southern Utah University Curriculum*; Annual GIS Awareness Seminar; Cedar City, Utah, November 29-December 3, 1993.

Vaughn, D.M. and Rickman, D.; 1993; *Spatial and Volumetric Changes in the Atchafalaya Delta, Louisiana*; **NASA/JOVE Annual Retreat**, Galveston, Texas, July, 1993.

Cope, M.P. & Vaughn, D.M.; 1993; *Assessing Differences Between Bayesian and Canonic Classification Algorithms*; **NASA/JOVE Annual Retreat**, Galveston, Texas, July, 1993.

Wood, D.J. & Vaughn, D.M.; 1993; *Analysis of Georeferencing Algorithms to Assess Spatial Accuracy*; **NASA/JOVE Annual Retreat**, Galveston, Texas, July, 1993.

Professional Reviews

Invited peer reviewer for the international journal *Geomorphology*. Reviewed a paper for a special volume of invited papers on *Mass Movement in the Himalaya*.

Invited peer reviewer for the international journal *Earth Surface Processes and Landforms*.

Other Documents (Technical Papers)

Vaughn, D.M.; 1996; *RSGISL Technical Brief 14*; Datums and Coordinate Systems, 3 pp's.

Vaughn, D.M.; 1996; *RSGISL Technical Brief 15*; Arc/Info Notes: Multiple Adjacent Coverages, 3 pp's.

Vaughn, D.M.; 1996; *RSGISL Technical Brief 16*; Internet Notes, 15 pp's. Written for students engaged in the *geospatial analysis* program to introduce them to data

acquisition techniques and available resources in the mapping sciences through access with the *Internet* and browsing programs such as *Netscape*. (Revised)

Vaughn, D.M.; 1996; *RSGISL Technical Brief 17; Slope and Aspect Models*; 4 pp's.

Vaughn, D.M.; 1996; *Geospatial Analysis at Weber State University*; 8 pp's (Outlines the purpose, history, curriculum, professional accomplishments, and facilities of the *geospatial analysis* program). (Revised)

Proposals Awarded

March 1996: Research & Professional Growth Grant entitled <i>Training Workshop for Arc/Info: A GIS Spatial Analysis Software Program.</i>	\$1,750 funded.
March 1995: Research & Professional Growth Grant entitled <i>Curriculum Enhancement in Geospatial Analysis.</i>	\$2,000 funded
April 1995: Academic Resources and Computing Committee, Proposal to Support the Campus Master Plan for <i>Computers in the College of Science Learning Center & Computer Lab (II).</i>	\$19,500 funded
May 1994: NASA /JOVE Augmentation Grant	\$10,122 funded.
April 1994: Academic Resources and Computing Committee, Proposal to Support the Campus Master Plan for <i>Computers in the College of Science Learning Center & Computer Lab.</i>	\$26,000 funded.
March 1994: Research & Professional Growth Grant to assess <i>Effects of Environmental Stressors on the Multicellular Behavior of Proteus Mirabilis</i> (Extension) (WSU).	\$800 funded.
August 1993: National Science Foundation Instrumentation and Laboratory Improvement Proposal (WSU).	\$86,920 funded.

Are you utilizing the Internet or other network? Yes, Internet.

Please identify the data sets, if any, used in your research.

None at this time.

Student Publications/Presentations:

Nyborg, C. & Nybrg, M.; 1995; *Proposed Wilderness Areas of the Dixie National Forest Using A GIS*; National Proceedings; 9th Annual Undergraduate Research Conference; Union College, Schenectady, N.Y.; April, 1995.

Wolfe, J.D.; 1995; *Radial Relief Displacement in Vertical Aerial Photographs*; National Proceedings; 9th Annual Undergraduate Research Conference; Union College, Schenectady, N.Y.; April, 1995.

Nyborg, M. & Nyborg, D.C. (Vaughn, D.M.); 1994; *Are We Losing Our Wilderness? A Look at the Evolution of the Roadless Areas of the Dixie National Forest, Utah*; Great Plains/Rocky Mountain Division; Association of American Geographers; Annual Convention; Salt Lake City, Utah; October, 1994.

Winkelaar, M.P.; 1994; *Modeling and Forecasting Avalanche Potential in Davis and Morgan Counties, Utah*; National Proceedings; 8th Annual Undergraduate Research Conference; Western Michigan University; Kalamazoo, Michigan; April, 1994.

Jennings, C.; 1994; *Modeling a Mountain Trails Park in Ogden, Utah Using a GIS*; National Proceedings; 8th Annual Undergraduate Research Conference; Western Michigan University; Kalamazoo, Michigan; April, 1994.

Read, D. (Vaughn, D.M.); 1994; *Coniferous Forests Along the Wasatch Front*; Great Plains/Rocky Mountain Division; Association of American Geographers; Annual Convention; Salt Lake City, Utah; October, 1994 (Abstr.).

Jennings, C. (Vaughn, D.M.); 1994; *A Humanist Paradigm in Geography*; Great Plains/Rocky Mountain Division; Association of American Geographers; Annual Convention; Salt Lake City, Utah; October, 1994 (Abstr.).

Wolfe, J. (Vaughn, D.M.); 1994; *Assessing Changes in Scale Within An Aerial Photograph with Respect to Changes in Elevation and Distance from Photographic Natir*; Great Plains/Rocky Mountain Division; Association of American Geographers; Annual Convention; Salt Lake City, Utah; October, 1994 (Abstr.).

Wood, D.J.; 1993; *Analysis of Georeferencing Algorithms to Assess Spatial Accuracy*; National Proceedings; 7th Annual Undergraduate Research Conference; University of Utah; Salt Lake City, Utah; April, 1993.

Cope, M.P.; 1993; *Assessing Differences Between Bayesian and Canonic Classification Algorithms*; National Proceedings; 7th Annual Undergraduate Research Conference; University of Utah; Salt Lake City, Utah; April, 1993.

Oral and Poster Presentations:

Vaughn, D.M.; 1995; *Geospatial Analysis as a Mechanism of Geographic Inquiry*; Association of American Geographers; National Convention; Chicago, Illinois; March, 1995.

Vaughn, D.M.; 1994; *Assessment of Surface-Generating Algorithms to determine Area and Volume*; Annual NASA/JOVE Retreat, Kennedy Space Center, Florida; June 1994 (Abstr.).

Jennings, C. and Vaughn, D.M.; 1994; *Modeling a Mountain Trails Park in Ogden, Utah Using a GIS*; Annual NASA/JOVE Retreat, Kennedy Space Center, Florida; June 1994 (Abstr.).

Winkelaar, M.P. and Vaughn, D.M.; 1994; *Modeling and Forecasting Avalanche Potential in Davis and Morgan Counties, Utah*; Annual NASA/JOVE Retreat, Kennedy Space Center, Florida; June 1994 (Abstr.).

Fall 1994: Presented a workshop on *Applications in Geospatial Analysis* to the Forth Annual NASA Science Teachers Workshop; September 1994.

II. Education

Assessment of Student Impact: Indicate the impact over your institution's three years i JOVE, that the Program has had on student enrollment and/or recruitment? Please provide before and after numbers for science majors by discipline, course enrollments, etc. Attach additional sheets as required.

The minor in *Geospatial Analysis* has attracted a variety of majors in the College of Science. The majority are Geography and Geology students. The program is five years old, and we began with 3-5 students completing the program in 1992. This year we will have about 12 students completing the program. Enrollment is around 20 students in the fall, and tapers to 8 to 12 by the last quarter. Most of the attrition is due to schedule problems, financial, and time constraints. We have sent seven students to the National Undergraduate Research Conference over the past three years. Six papers were accepted for publication in the *National Proceedings*. Three students over the past two years have entered graduate school, and are studying geospatial analytical applications.

Student Research Assistants:

<u>Undergraduate Assistants:</u>	<u>Research Area</u>	<u>Major</u>
Jennings, Caril	Terrain Evaluation	Geospatial Analysis (B.I.S.)

Nyborg, Mitzi	Geospatial Analysis	Geography/ Geospatial Analysis
Burbano, Jarom	Gepspatial Analysis	Geography Geospatial Analysis
Wolfe, Jason	Basic Photogrammetry	Geography Geospatial Analysis
Ray, Clark	Geospatial Analysis	Applied Environmental Geosciences
Merrill, Camille	Geospatial Analysis	Geography

III. Curriculum Development

See attached document, *Geospatial Analysis at Weber State University*.

New Curricula:

None formally. A global positioning system and community base station for differential correction has been added to the RSGISL. The GPS mapping tools are currently being developed for the *geospatial analysis* curriculum, and have been formally introduced.

New Courses:

Remote Sensing 440, Advanced Digital Image Processing.

Amended Courses:

Laboratory exercises in GIS and digital image processing were modified to account for changes in software upgrades, and curriculum revisions. The introduction of Arc/Info-NT, Arc/View, Spatial Analyst, Network Analyst, and ERDAS Imagine software have necessitated a complete revision of laboratory exercises and procedures.

Reading or Independent Study Courses:

Geography 480: Independent Study (2-3 credit hours). No syllabus is provided. The students opt to continue work on a research paper associated with *geospatial analysis*. See section on student research.

IV: Outreach:

Community:

<u>Outreach Effort</u>	<u>Location</u>	<u>Number of Attendees</u>
Workshop on Applications in Geospatial Analysis to the Annual NASA Science Teachers Workshops	WSU Ogden, Utah	10-15

Students:

<u>Outreach Effort</u>	<u>Location</u>	<u>Number of Attendees</u>
Workshop on Applications in Geospatial Analysis to the Annual NASA Science Teachers Workshops	WSU Ogden, Utah	10-15

Faculty:

<u>Outreach Effort</u>	<u>Location</u>	<u>Number of Attendees</u>
Workshop on Applications in Geospatial Analysis to the Annual NASA Science Teachers Workshops	WSU Ogden, Utah	5-10

V. Summer Programs

No summer programs developed.

VI-VIII. "Roadblocks" to Progress/Suggestions, Program Changes, and Institutional Benefits.

As a result of four years experience in the NASA/JOVE program, I sense a need for a longer and more continuous time commitment from mentors to allow more productive interaction between a mentor and university faculty during research ventures. The relocation and reassignment of my mentor has led me to working more on my own and with students, than that of NASA projects. Severe limitations in that travel to field sites a continent away becomes practically impossible due to other unavoidable problems such as: scheduling conflicts between mentor and other JOVE faculty, academic responsibilities, and inadequate funds. While on site at Stennis, research was optimal, however, academic responsibilities to the university and students requires adjustments that limit research productivity at undergraduate institutions such as ours. Collectively, my students are actively engaged in research with me, which is

actually in keeping with this institution's commitment to excellence in undergraduate education.

I feel NASA should be pleased that we are stimulating students to pursue research, and relax their standards on faculty that have as their primary mission, teaching and curriculum. In my case, I must also manage, direct, troubleshoot, and maintain a highly technical computer laboratory for GIS and remote sensing (RSGISL). I have no lab technicians or systems analysts to help me. If research is the fundamental objective, undergraduate institutions may not be the appropriate audience, since we are evaluated on different criteria than research institutions. The fact that we can contribute to research through our students is a testimony of our commitment to academic excellence. Ultimately, NASA will gain through an increase in the pool of highly qualified scientists that will graduate from the JOVE program and others that have contributed additional educational experiences for undergraduate students. I shall always be grateful for the opportunity that NASA has provided through the JOVE program, and can only hope that I have made a significant contribution to the overall mission of enhancing scientific inquiry in higher education.

IX. Please list all subject inventions as a result of this award or provide a statement that there were none.

No inventions were made.

Approved by:

Sammy M. Vaughn, Ph.D.

Principal Investigator or Program Coordinator